and using supporting treatment, the swelling will gradually leave and subsequently the remaining varices can be injected.

In conclusion, I would add that no procedure has given us or our varicose patients such satisfaction with such a small amount of effort as is involved in the injection and cure of varicose veins.

EXTERNAL BONE PLATING FOR LONG BONES*

By CHARLES ALFRED DUKES, M. D.
Oakland

DISCUSSION *by W. C. Adams, M. D., Oakland; Philip Stephens, M. D., Los Angeles; Lionel D. Prince, M. D., San Francisco.*

IN preparing a paper upon external bone plates or external fixation apparatus for fracture of the long bones, it is not my purpose to enter into theory of this practice, but to give some of the interesting points that have been developed in my use of this method of splinting of the fractures of long bones. Lambotte, twenty years ago, wrote an article illustrating his method of external bone plates (Fig. 1). Since that time there have been few articles until the appearance of the recent one by Mercier of Montreal.

DUKES' METHOD

Some ten years ago, in a compound fracture where it seemed impossible to get the proper fixation of the fractured bones, I devised from an old Lane plate and a couple of nuts on some stove bolts, a fixation plate with only the ends of the bolts that were screwed into the bones remaining buried. This device was not satisfactory, but it did hold the bones in position until such time as external fixation retained them in firm position.

From that time I began to improve the type of bolt and plate until I developed the external bone plate which is here discussed. I am sure that the simplicity of this method will recommend it. Most of the plates that have been used heretofore have been complicated and inefficient.

Our first difficulty was encountered in screwing the bolts into the bone. First boring the holes was tried; then threading them and screwing the bolts in with the screwdriver. Then a drill slightly larger than the bolt was used so that the bolts were screwed in easily, but this did not answer satisfactorily because the bolts were liable to slip out. Later I devised a bolt with a pointed tip and a square head and screwed the bolts in with a wrench. This had its disadvantage because sometimes the bolt head was twisted off. This fault was due to the manufacture of the bolt. The most satisfactory bolt has been an ordinary screw-headed bolt of malleable steel used with an ordinary screwdriver to screw it tightly into place. Some of the failures of this method were due to the improper insertion or depth of the bolt into the bone. In one plate which was placed in the femur, the two upper bolts came out of the bone because of the tension (Figs. 2 and 3). This was due to the bolts not being screwed in deep enough. In another case the tip of the bolt, because of the stress placed thereon, was broken off in the bone; and later it was necessary to remove the tip with a chisel. None of these patients had any serious or lasting effects of ill character from our crude method of application of this device.

In patients where the reduction of the long bone is simply by external manipulation and where it is not desired to make a long incision, a trocar can be introduced under the fluoroscope, the trocar removed and the shield left in place. A drill can be introduced through this and holes made in the bone, and the bolt can be introduced and screwed into place. This makes a procedure as simple as introducing the Steinman pin or a pair of tongs, and with no more attendant dangers.

MERCIER'S METHOD

In the cases where it is necessary to reduce the fracture by the open method, the method used by Mercier of Montreal is excellent.

An incision of the skin and subcutaneous tissue is made down to the bone, the middle of the in-

* Read before the Industrial Medicine and Surgery Section of the California Medical Association at its Fifty-Seventh Annual Session, April 30 to May 3, 1928.

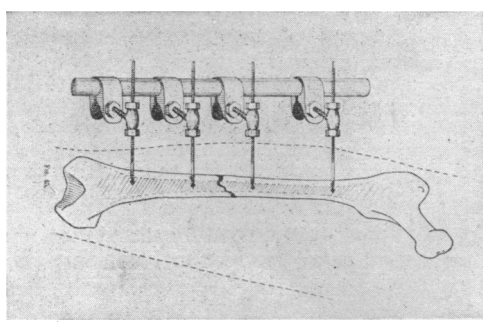

Fig. 1.—Lambotte's earliest plate

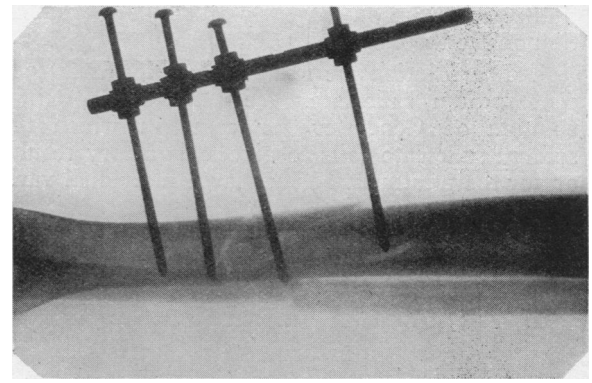

Fig. 2 (a).—Anterior view of Dukes' plate in position on compound fracture of tibia and fibula

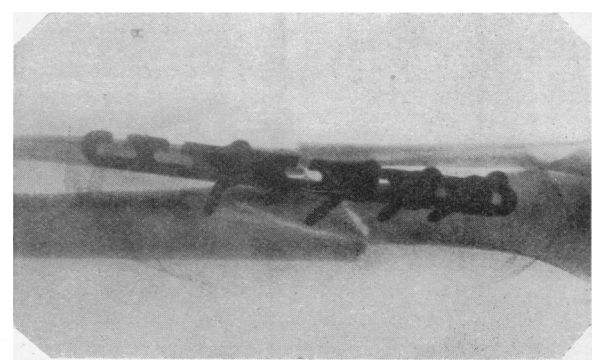

Fig. 2 (b).—Posterior view

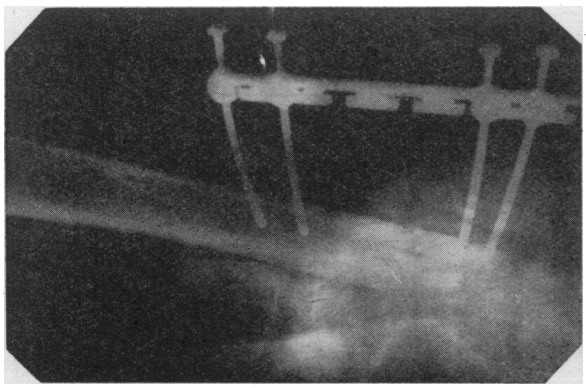

Fig. 3.—Dukes' bone plate in faulty position in femur

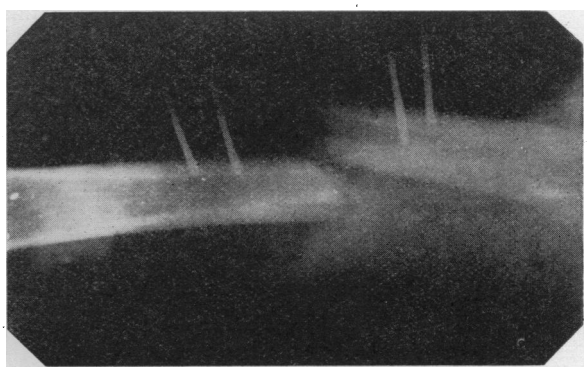

Fig. 5.—Same fracture showing displacement after the upper bolts became loosened

cision being opposite the seat of the fracture and about one inch longer than the plate of the fixation set. The fragments of the bone being completely stripped of their surrounding tissue, their ends are brought out of the wound and cleaned of all tissue or new formation, whether hard or soft, and reduced as may be indicated. The four holes are then drilled to receive the screws through only one side of the bone. The principle is used by Mercier, of two nuts separated on a bolt so that the plate is introduced between them. These nuts are then locked against the plate, fixing it in any position which is desired to hold the bones in proper apposition.

The after-treatment of bone fixation is exceedingly simple, and where the technique is properly carried out, we have not seen any complications arising from the boring of the holes into the bone.

The removal of the plate at the end of two to four weeks is exceedingly simple and painless. The nuts on the plate are unlocked, the plate removed, and the bolts come out very easily by unscrewing them.

In my experience there is no objection to the use of the external bone plate. It is only advocated and advised in those conditions where other methods of a simpler character fail to splint the fractured bone properly.

It has its place in compound fractures (Fig. 4) as well as in simple fractures. This method is presented for the purpose of eliciting suggestions in the improvement of the mechanical device and also to bring to your attention a method which, in my opinion, can be used much more frequently than is done at the present time.

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Note.—Owing to lack of space, only a few illustrations are reproduced in California and Western Medicine. Additional illustrations will be printed in the reprints, which may be had by addressing the author.

DISCUSSION

W. C. Adams, M. D. (802 Medical Building, Oakland).—The Dukes external bone plate has a very definite use in bone surgery. I see its greatest value in the treatment of recent compound fractures of the long bones. It is a great satisfaction to know that the fragments are being held firmly in apposition during the sloughing and infectious stage usually encountered in ragged and dirty compound fractures. By fixing, it aids in the prevention of bone infection or hastens the recovery of infections in these cases in that it stops irritation caused by the movement of fragments. By its use one may dress and cleanse the open wound without fear of disturbing the loose bone ends.

I now have on hand a case in which the leg was two-thirds amputated four inches above the ankle joint. By means of the Dukes' bone plate I was able to fix the tibial fragments for ten days, and at the end of this period new tissue growth had taken place between the fragments and, by further splinting, the fragments have held in fine apposition. Without its aid such a condition would have been extremely difficult to obtain, there being much tissue destruction with the resultant sloughing and infection.

It may be employed very satisfactorily in the simple fractures which have a tendency to displacement. I used it in a widely dislocated simple fracture of the upper third of the femur with excellent results.

The danger of infection entering from without alongside the screws is negligible, for there is sufficient serous drainage flowing outwardly to prevent

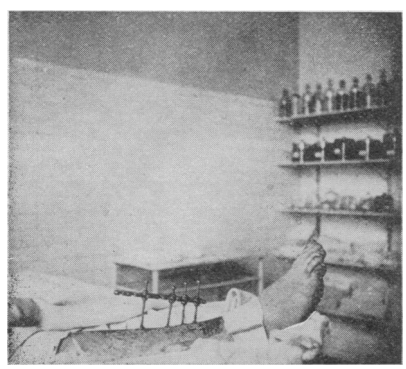

Fig. 4.—Photograph of external bone plate in position. Compound fracture of tibia and fibula.

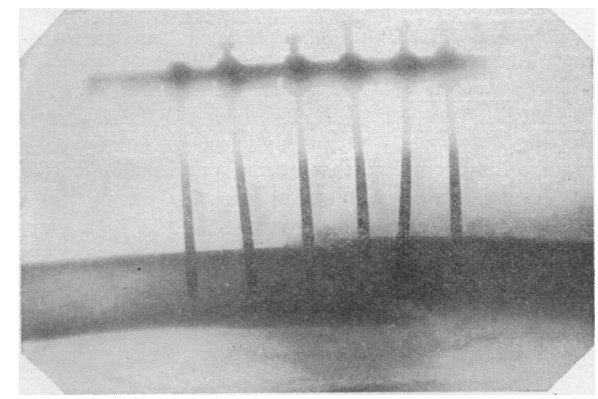

Fig. 6.—Dukes' bone plate in position in fracture showing use of six bolts instead of four

any invasion and should any infection from within occur, the screws permit of good drainage.

The surgeon will find the application of the Dukes plate quite simple when Mercier's method is used, and after having once employed it he will have learned of a valuable method of treatment in fractures of the long bones.

❀

PHILIP STEPHENS, M. D. (1136 West Sixth Street, Los Angeles).—Any method devised which will bring about skeletal approximation and immobilization to a fractured bone is ideal. Obviously the great drawback to this method of approximation and immobilization is the necessity for either open operation or the subcutaneous insertion of Steinman pin, tongs, or other methods which need constant attention, apparatus for extension, etc., along with the danger of infection.

The old Lambotte external bone plate was a simple method of accomplishing positive or skeletal treatment of fractures, but was not used to any great extent by reason of the fact that the fragments were rather difficult to bring into approximation—even after the screws were inserted—due to the difficulty in connecting the screws with the plate.

From Doctor Dukes' description of his method, and after a personal interview and discussion following the reading of his paper, I was very forcibly struck with the improvement of his screw plate and method of application over that of the old Lambotte apparatus, the great advantage being, in my opinion, due to the ease with which the plate is applied after the screws are inserted by an ingenious slotting of the plate and range of fixation of the screws and bolts to it.

We are all rather inclined to use certain tools, or methods, over a period of years to the exclusion of other methods, and rather prone to be slow in the adoption of new tools and new methods, and are particularly not desirous of going back to the use of apparatus and methods which have been, in a measure, discarded. The average surgeon who investigates Doctor Dukes' method in a superficial manner is apt to leap to the conclusion that it is a simple revival of the old Lambotte method. We wish to warn against this hasty impression if it exists, for we feel that the Dukes method is not only original in its conception, but is a useful, ingenious, and easily applied method for a positive skeletal approximation and immobilization of fractures. It has sufficiently impressed us with its value to warrant its use and recommendation to others doing the same character of work.

❀

LIONEL D. PRINCE, M. D. (490 Post Street, San Francisco).—Doctor Dukes is to be congratulated on bringing before the medical profession a modification in the method of long-bone fixation, which I consider to be a real contribution to surgery. The ability to easily improve the alignment of the bone following x-ray examination, simply by an adjustment of his modification screw plate, presents a distinct advancement over other similar methods of fixation.

The handling of fractures of long bones always presents many difficulties, and this factor alone has resulted in the invention and modification of many different types of fixation appliances. Methods become popular for a period of time and are then discarded or replaced by newer methods. Some surgeons become exceedingly proficient or adept in the use of certain procedures of fixation to the exclusion of all other methods. For the average surgeon treating fractures, no single method is the best, and he must modify his procedure to suit the requirement of the case in hand.

Doctor Dukes' method is not one that will tend to prove popular, as it demands a certain amount of special surgical skill and judgment that can only result from its repeated use. I believe, however, that its use offers tremendous advantages in compound fractures where many of the ordinary simple methods cannot be used and where complete fixation and constant accessibility to the wound is so essential.

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DOCTOR DUKES (closing).—In closing the discussion I wish to thank Doctors Adams, Stephens, and Prince for their favorable consideration of this addition to fixation of long bones.

I should like to emphasize the necessity of placing the bolts deep enough into the bone tissue so that the stress placed upon them will not cause them to become displaced. This may, at times, require putting the bolts completely through the bone.

THE SPASTIC COLON*

By QUINTER O. GILBERT, M. D.
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DISCUSSION *by Ernest S. du Bray, M. D., San Francisco; Fred H. Kruse, M. D., San Francisco; R. Manning Clarke, M. D., Los Angeles; John V. Barrow, M. D., Los Angeles.*

THE understanding of motor phenomena of the colon enables us to evaluate clinical symptomatology. An attempt to explain the symptoms of a patient with gastro-intestinal trouble by the mechanism of physiological complexes is in many ways valuable to the patient, but it is more important to the physician as an incentive to the study of the rationale of the disorders presented. It is with difficulty that any given part of a motor mechanism so synchronously arranged as the gastro-intestinal tract can be considered without considering the whole; still, we wish to consider more especially the disorders arising from the large bowel.

It is timely to discuss some of these problems, without being too controversial. A perusal of the literature of the past three decades convinces us that our knowledge of the mechanism of the lower bowel is still incomplete. The greatest advance has taken place in the past decade, and in this country mostly in the last part of this period. This, we believe, is due to the development of a physiological viewpoint. The x-ray has given us new vision and enabled us to separate some truths and facts from a heritage rich in false conceptions.

Constipation is one of the commonest of complaints. To the lay mind it means misery, mental and physical, because of real or fancied lack of relief from pathological complexes by the evacuation of fecal contents. This is a problem in medicine because it involves the heritage of misconceptions, amplified by propaganda of health restaurants, and of diet specialists.

"Constipation" is a rather meaningless term and should be considered under the general head of "Disordered Bowel Movement." Our notion of this condition has undergone change during recent years, because of the larger experience gained in following the histories of private, surgical and nonsurgical patients over longer periods of time. This experience aided by a scientific background has obliged us to approach these problems from a physiological viewpoint.

MECHANISM OF MOTION

When considering the large colon, we are considering a tube which is the lower segment of a complex chemical mill, the contents of which are propelled by the musculature, the contraction of which produces various effects in size and shape and position of a segment of gut, such as narrow-

* Read before the General Medicine Section of the California Medical Association at the Fifty-Sixth Annual Session, April 25-28, 1927.